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REMARKS

Upon entry of the proposed amendments, claims 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16 and 18 will remain pending in the present application. Claims 7, 10, 13 and 16 have been amended. All of the pending claims stand rejected. No new claims have been added to the application. The proposed amendments presents no new matter.

Entry of the amendment is requested under 37 C.F.R. 1.116, as the amendments merely add the word "removed" to each of the claims 7, 10, 13 and 16 in order to make the claims more definite. The amendment raises no new issues that would require further search or consideration by the Examiner.

Prior Art Rejections

Rejection Under 35 USC 103

Claims 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16 and 18 stand rejected under 35 U.S.C. 103 as being obvious from Braun (U.S. Patent no. 6,451,471) in view of Yamada et al (U.S. Patent no. 6,500,893).

The Braun patent is discussed on pages 4 and 5 of the background portion of the present application as follows:

US Patent No. 6,451,471 to Braun discloses a method of manufacturing a PEMFC current collector plate. The method includes the steps of: providing a current collector plate having land areas on opposing surfaces of the plate, and then removing a layer of the composition from at least one of the land areas. After the layer removal, the new land areas have reduced concentrations of polymer. The layer removal is preferably performed using machining, sanding or surface grinding. The thickness of the layer to be removed must be sufficiently large to remove the areas of high polymer concentration. It may also be desirable to remove an even greater thickness to improve the molding process. The removed layer should be between 0.001 and 0.5 cm thick, and is preferably in the range of 0.015 and 0.06 cm thick. This layer removal is said to result in increased overall conductivity of the molded current collector plate.

The Braun patent states that the "removed layer should be between 0.001 and 0.5 cm [between 10 and 5000 micrometers], and is preferably in the range of 0.015 and 0.06 cm [range of 150 and 600 micrometers] thick." (Col. 3, lines 2-4; Col. 4, lines 45-49). The Braun patent further discloses that the desired reduction in electrical resistance is not achieved until between 0.025 and 0.030 cm have been removed from the surface of the molded plate. (Col. 5, lines 37-45; Figures 3 and 5).

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In view of the teachings of the Braun patent, one skilled in the art would not expect that the electrical resistance of a composite current collector plate of a proton exchange membrane fuel cell could be improved by removing a surface layer of no more than 5 microns as recited in amended independent claims 1, 4, 7, 10, 13 and 16 of the present application. Contrary to the teachings of the Braun patent, applicants have found that the desired reduction in resistivity is achieved with the process of the invention by the time 4 micrometers have been removed from the surface of a composite plate comprised of 10 to 50 weight percent plastic, 10 to 70 weight percent graphite fiber filler and 0 to 80 weight percent graphite powder filler. This is contrary to the teachings of Braun which states that removal of range of 150 and 600 micrometers is preferred to improve conductivity and that removal of at least 10 micrometer is necessary. (Col. 3, lines 2-4; Col. 4, lines 45-49). The Braun patent shows that it was wholly unexpected that the conductivity of a plastic/graphite fiber current collector plate could be improved by removing a surface layer of less than 5 microns from the plate thickness.

The Yamada patent has no disclosure suggesting a composite current collector plate of a proton exchange membrane fuel cell could be improved by removing a surface layer of the composite plate. According the invention recited in amended independent claims 1, 4, 7, 10, 13 and 16 is not rendered obvious by the combination of the Braun and Yamada patents.

Dependant claims 3, 6, 9, 12, 15 and 18 each further specify that the plate thickness is reduced by an amount within the range of 2 to 4 micrometers. The data in Table 2 of the application specification shows that conductivity is significantly reduced by the removal of as little as 2 micrometers from the surface of the plate, and that the great majority of the conductivity improvement is achieved by the time that 4 micrometers has been removed from the surface of the plate. This is very surprising given the contrary teachings of Braun which provides that removal of 150 and 600 micrometers is preferred to improve conductivity and that removal of at least 10 micrometer is necessary. Accordingly, dependant claims 3, 6, 9, 12, 15 and 18 are even more clearly not rendered obvious by the combination of the Braun and Yamada patents.

With the process of the current invention, collector plates can be machined in less time and there is far less waste than with the process disclosed in the cited references. In addition, with the process of the present application, it is possible to produce thinner and lighter plates than is the case with the process of the Braun patent where much more material must be removed from the surface of the collector plates or the Yamada patent which discloses no removal of a surface layer at all.

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In view of the foregoing, allowance of the above-referenced application is respectfully requested. If any fee is required to authorize or obtain consideration of this response, please charge such fee to Deposit Account No. 04-1928.

Respectfully submitted,



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